

## V. MODULE V - GROUND-WATER DETECTION MONITORING

### V.A. DETECTION MONITORING PROGRAM

This Module specifies the requirements of the Detection Monitoring Program (**DMP**). The DMP shall establish background ground-water quality and monitor indicator parameters and waste constituents that provide a reliable indication of the presence of hazardous constituents in the ground water, as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.97 and 264.98). Indicator parameters, waste constituents, and hazardous constituents hereinafter are referred to in this module as "parameters and/or constituents".

The DMP consists of seven (7) Detection Monitoring Wells (**DMWs**) located hydraulically upgradient and at the downgradient point of compliance of the WIPP Underground Hazardous Waste Disposal Units (**Underground HWDUs**). Six (6) DMWs are screened in the Culebra Member of the Rustler Formation; one (1) DMW is screened in the Dewey Lake Formation.

A DMP is necessary to demonstrate compliance with the environmental performance standard for the Underground HWDUs, as specified in 20.4.1.500 NMAC (incorporating 40 CFR §264.601(a)). This environmental performance standard requires prevention of any releases that may have adverse effects on human health or the environment due to migration of waste constituents in the ground water or subsurface environment.

### V.B. IDENTIFICATION OF POINT OF COMPLIANCE

The point of compliance is the vertical surface located perpendicular to the groundwater flow direction at the DMWs that extends to the Culebra Member of the Rustler Formation [20.4.1.500 NMAC (incorporating 40 CFR §§264.95, 264.601, and 264.602)]. The Permittees shall conduct the DMP at DMWs specified in Table [V.C.1](#), and as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.98 and 264.601).

### V.C. WELL LOCATION, MAINTENANCE, AND PLUGGING AND ABANDONING

The Permittees shall conduct the DMP according to the requirements of this Permit and 20.4.1.500 NMAC (incorporating 40 CFR §264 Subpart F) for six (6) DMWs in the Culebra Member of the Rustler Formation, and for one (1) DMW in the Dewey Lake Formation.

The Permittees shall maintain the DMP in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.97), and as specified below:

#### V.C.1. Well Locations

The Permittees shall maintain the DMWs at the locations specified on the map in Figure L-8 of Permit Attachment L, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.97(a) and §264.98(b)), and as specified in Table [V.C.1](#) below:

Table <a href="#">V.C.1</a> - Well Locations				
Well Name	State Plane Coordinates	Top of Casing Elevation (ft amsl)	Screen Interval Depth (ft below ground surface)	Sampled Unit
WQSP-1	663595E, 503784N	3419.2	702 - 727	Culebra
WQSP-2	667580E, 505537N	3463.9	811 - 836	Culebra
WQSP-3	670573E, 503991N	3480.1	844 - 869	Culebra
WQSP-4	670645E, 494986N	3433.1	764 - 789	Culebra
WQSP-5	667165E, 493665N	3384.4	646 - 671	Culebra
WQSP-6	663681E, 494948N	3364.7	581 - 606	Culebra
WQSP-6a	663615E, 494974N	3363.8	189 - 214	Dewey Lake

#### V.C.2. Well Maintenance

The Permittees shall maintain the DMWs specified in Table [V.C.1](#) and in Permit Attachment L, Section L-3b and Figures L-10 through L-16, and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.97(c) and §264.98(b)).

#### V.C.3. Well Plugging and Abandoning

The Permittees may propose to plug and abandon a DMW by submitting a permit modification request to the Secretary in compliance with 20.4.1.900 NMAC (incorporating 40 CFR §270.42). The Permittees shall plug and abandon any DMW in a manner which eliminates physical hazards, prevents ground-water contamination, conserves hydrostatic head, and prevents intermixing of subsurface water. The Permittees shall submit a report to the Secretary which summarizes and certifies DMW plugging and abandoning methods within ninety (90) calendar days from the date a DMW is removed from the DMP.

#### V.D. DETECTION MONITORING PROGRAM PARAMETERS AND CONSTITUENTS

The Permittees shall conduct the DMP at the DMWs as specified in Table [V.C.1](#) for the parameters and constituents listed in Table [V.D](#) below and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(a)):

Table <a href="#">V.D</a> - Parameter or Constituent	
pH	Specific conductance
Total organic carbon (TOC)	Total organic halogen (TOH)
Total dissolved solids (TDS)	Total suspended solids (TSS)
Density	Calcium

Table <a href="#">V.D</a> - Parameter or Constituent	
Magnesium	Potassium
Chloride	Iron (Total Fe)
Chloroform	1,2-dichloroethane
Carbon tetrachloride	Chlorobenzene
1,1-dichloroethylene	1,1-dichloroethane
Methylene chloride	1,1,2,2-tetrachloroethane
Toluene	1,1,1-trichloroethane
Cresols	1,4-dichlorobenzene
1,2-dichlorobenzene	cis-1,2-dichloroethylene
	trans-1,2-dichloroethylene
2,4-dinitrophenol	2,4-dinitrotoluene
Hexachloroethane	Hexachlorobenzene
Isobutanol	Methyl ethyl ketone
	Pentachlorophenol
Pyridine	Tetrachloroethylene
1,1,2-Trichloroethane	Trichloroethylene
Trichlorofluoromethane	Xylenes
Nitrobenzene	Vinyl chloride
Arsenic	Barium
Cadmium	Chromium
Lead	Mercury
Selenium	Silver
Antimony	Beryllium
Nickel	Thallium
Vanadium	

#### V.E. SAMPLING AND ANALYSIS PROCEDURES

Except as provided in Permit Condition [V.F.1](#), the Permittees shall use the following techniques and procedures to obtain and analyze DMP samples, including background ground-water quality samples, from the DMWs specified in Table [V.C.1](#), as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.97(d) and (e)):

V.E.1. Sample Collection Procedures

The Permittees shall collect one (1) DMP sample and one (1) DMP sample duplicate semiannually from each DMW using the procedures specified in Permit Attachment L, Section L-4c, as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.97(g)(2), 264.98(d), and 264.601(a)).

V.E.2. Sample Preservation and Shipment Procedures

The Permittees shall preserve and ship DMP samples using the procedures specified in Permit Attachment L, Section L-4c(2)(iv).

V.E.3. Analytical Procedures

The Permittees shall analyze DMP samples using the procedures specified in Permit Attachment L, Section L-4c(3).

V.E.4. Chain of Custody Procedures

The Permittees shall track and control DMP samples using the chain of custody procedures specified in Permit Attachment L, Section L-4c(2)(v).

V.F. BACKGROUND GROUND-WATER QUALITY

For those parameters and constituents listed in Table [V.D](#), and for all substances listed in 20.4.1.500 NMAC (incorporating 40 CFR §264 Appendix IX), the Permittees shall establish background ground-water quality as specified in Permit Attachment L, L-4e(4) and 20.4.1.500 NMAC (incorporating 40 CFR §§264.97(g) and 264.98(d)).

V.F.1. Background Sampling Frequency

The Permittees shall establish background ground-water quality for each required parameter and constituent using data from semi-annual sampling collected over a two year period for all DMWs specified in Table [V.C.1](#) and Permit Attachment L, Section L-4a.

V.F.2. Number of Background Samples

The Permittees shall collect a minimum of four samples from each DMW specified in Table [V.C.1](#) to determine background ground-water quality for each parameter and constituent listed in Table [V.D](#), and for all substances listed in 20.4.1.500 NMAC (incorporating 40 CFR §264 Appendix IX) as specified in Permit Attachment L, Section L-4a.

V.F.3. Reporting of Background Values

The Permittees shall submit the background ground-water quality data specified in Permit Condition [V.F](#) to the Secretary, as specified in 20.4.1.500 NMAC (incorporating 40 CFR §264.97(j)), prior to disposal of TRU mixed waste, except as provided in Permit Condition [V.F.4](#).

V.F.4. Additional Background Sampling

For those parameters and constituents listed in Table [V.D](#) which the Permittees have not met the requirements of Permit Condition [V.F.1](#) for establishing background ground-water quality at the time the Permit is approved, the Permittees shall collect additional background ground-water quality data to comply with the following conditions:

- V.F.4.a. Procedures - the Permittees shall use procedures specified in Permit Conditions [V.E](#), [V.F.1](#), and [V.F.2](#).
- V.F.4.b. Upgradient wells - the Permittees shall collect background ground-water quality data only from hydraulically upgradient DMWs.
- V.F.4.c. Report - the Permittees shall submit the background ground-water quality data to the Secretary within three (3) months of complying with Permit Condition [V.F.1](#).

V.F.5. Determination of Background Ground-Water Quality

Upon receipt of the report on background ground-water quality specified in Permit Conditions [V.F.3](#) or [V.F.4.c](#), the Secretary shall modify the Permit in compliance with 20.4.1.900 NMAC (incorporating 40 CFR §270.41(a)(2)) to specify the background ground-water quality for the parameters and constituents specified in Table [V.D](#).

V.G. GROUND-WATER SURFACE ELEVATION DETERMINATION

V.G.1. DMP Ground-Water Surface Elevation Determination

The Permittees shall determine the ground-water surface elevation at each DMW specified in Table [V.C.1](#) each time the ground water is sampled in compliance with Permit Conditions [V.E.1](#) and [V.I.2](#), using the methods specified in Permit Attachment L, Section L-4c(1), and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.97(f)).

V.G.2. Regional Ground-Water Surface Elevation Determination

The Permittees shall determine the ground-water surface elevation on a monthly basis for each well completed in the Culebra Member of the Rustler Formation in the WIPP Ground-Water Level Monitoring Program, as specified in Permit Attachment L, Section L-4c(1).

V.H. GROUND-WATER FLOW DETERMINATION

The Permittees shall determine the ground-water flow rate and direction in the Culebra Member of the Rustler Formation at least annually, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(e)). The Permittees shall use ground-water surface elevation data specified in Permit Condition [V.G](#) to determine ground-water flow.

## V.I. DATA EVALUATION

### V.I.1. Statistical Procedures

The Permittees shall use the statistical analysis methods specified in Permit Attachment L, Section L-4e, to evaluate DMP data for each parameter or constituent as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.97(h)). These statistical analysis methods shall comply with the appropriate performance standards specified in 20.4.1.500 NMAC (incorporating 40 CFR §264.97(i)).

### V.I.2. Ground-Water Quality Determination

The Permittees shall sample DMWs as specified in Permit Condition [V.E.1](#) and conduct statistical tests to determine whether there is statistically significant evidence of contamination for any parameter or constituent specified in Table [V.D](#) during the active life of the WIPP facility and post-closure care period as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.90(c)).

### V.I.3. Data Evaluation

The Permittees shall determine whether there is statistically significant evidence of contamination for any parameter or constituent identified in Table [V.D](#) each time the DMWs are sampled as specified in Permit Condition [V.I.2](#). In determining whether statistically significant evidence of contamination exists, the Permittees shall compare the ground-water quality at each DMW specified in Table [V.C.1](#) to the background ground-water quality determined pursuant to Permit Condition [V.F](#), in compliance with the statistical procedures specified in Permit Condition [V.I.1](#), and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(f)).

### V.I.4. Data Evaluation Timeframe

The Permittees shall perform the data evaluations specified in Permit Condition [V.I.3](#) within one hundred twenty (120) calendar days after completion of DMP sampling, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(f)(2)).

## V.J. RECORDKEEPING AND REPORTING

### V.J.1. Operating Record Requirements

The Permittees shall enter all DMP monitoring, testing, and analytical data in the operating record as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.73(b)(6)). The Permittees shall enter this data, as measured and in a form appropriate for the determination of statistically significant evidence of contamination, into the operating record as specified in Permit Condition [V.I.1](#) and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(c)).

V.J.2. Submittal of Results

- V.J.2.a. Data evaluation results - the Permittees shall submit to the Secretary the analytical results required by Permit Conditions [V.E.1](#) and [V.I.2](#), and the results of the statistical analyses required by Permit Condition [V.I.3](#), in compliance with the schedule on Table [V.J.2.a](#) below, and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.97(j)):

Table <a href="#">V.J.2.a</a> - Analytical Results Submittal Schedule	
Samples to be collected during the preceding months of:	Results due to the NMED Secretary by:
March - May	One hundred twenty (120) calendar days after final sample is collected
September - November	One hundred twenty (120) calendar days after final sample is collected

Analytical results of a sampling round may be included in the report specified in Permit Condition [V.J.2.c](#) if publication of the report coincides with the one hundred twenty (120) calendar day report submittal schedule.

- V.J.2.b. Ground-water surface elevation results - the Permittees shall submit to the Secretary ground-water surface elevation data specified in Permit Condition [V.G](#). This submittal shall include both ground-water surface elevations calculated from field measurements and fresh-water head elevations calculated as specified in Permit Attachment L, Section L-4c(1). Water level data shall be submitted within thirty (30) calendar days after data are collected.
- V.J.2.c. Ground-water flow and radionuclide sampling results - the Permittees shall submit to the Secretary an evaluation of the ground-water flow data specified in Permit Condition [V.H](#) and the results of radionuclide-specific analysis of groundwaters sampled from the DMWs in the Annual Site Environmental Report by October 1 of each calendar year.

V.J.3. Determination of Contamination

If the Permittees determine, pursuant to Permit Condition [V.I](#) and 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)), that there is statistically significant evidence of contamination for any parameter or constituent specified in Table [V.D](#), the Permittees shall comply with the following:

- V.J.3.a. Notification - the Permittees shall notify the Secretary in writing within seven (7) calendar days, indicating what parameters or constituents have shown statistically significant evidence of contamination, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)(1)).
- V.J.3.b. Appendix IX sampling - the Permittees shall immediately, but no later than one (1) month, sample the ground water in all DMWs specified in Table [V.C.1](#) for which there was statistically significant evidence of contamination. The remaining DMWs shall be sampled within two (2) months after statistically significant evidence of contamination is found in any DMW. All DMWs shall be sampled to determine the concentration of all substances identified in 20.4.1.500 NMAC (incorporating 40 CFR §264 Appendix IX), as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)(2)).
- V.J.3.c. Verification sampling - as specified by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)(3)), for any substances found in the initial analysis pursuant to Permit Condition [V.J.3.b](#), the Permittees may resample within one (1) month and repeat the analysis for those compounds detected. If the results of the second analysis confirm the initial analysis, these substances shall form the basis for compliance monitoring specified in Permit Condition [V.J.3.d](#). If the Permittees do not resample, the substances found during the initial analysis specified in Permit Condition [V.J.3.b](#) shall form the basis for compliance monitoring specified in Permit Condition [V.J.3.d](#).
- V.J.3.d. Submittal of compliance monitoring program - the Permittees shall, within ninety (90) calendar days, submit to the Secretary an application for a permit modification to establish a compliance monitoring program meeting the requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.99). The application shall include the following information, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)(4)):
  - i. An identification of the concentration of any parameter or constituent specified in Table [V.D](#) or



any Appendix IX substance detected in the ground water at each DMW at the compliance point.

- ii. Any proposed changes to the DMP necessary to meet the compliance monitoring requirements as specified in 20.4.1.500 NMAC (incorporating 40 CFR §264.99).
- iii. Any proposed additions or changes to the monitoring frequency, sampling and analysis procedures or methods, or statistical methods used necessary to meet the compliance monitoring requirements as specified in 20.4.1.500 NMAC (incorporating 40 CFR §264.99).
- iv. For each parameter or constituent detected at the compliance point, a proposed concentration limit or a notice of intent to seek an alternate concentration limit for a parameter or constituent required by 20.4.1.500 NMAC (incorporating 40 CFR §264.94).

V.J.3.e. Submittal of additional information - the Permittees shall, within one hundred eighty (180) calendar days, submit to the Secretary the following information, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)(5)):

- i. All data necessary to justify an alternate concentration limit proposed in compliance with Permit Condition [V.J.3.d.iv](#).
- ii. An engineering feasibility plan for corrective action required by 20.4.1.500 NMAC (incorporating 40 CFR §264.100), if necessary.

V.J.4. Demonstration of Outside Contamination

If the Permittees determine, pursuant to Permit Condition [V.I](#), that there is a statistically significant difference for parameters or constituents specified in Table [V.D](#) at any DMW at the compliance point, they may demonstrate that a source other than a regulated unit caused the increase or that the detection is an artifact caused by an error in sampling, analysis, statistical evaluation, or natural variation in the ground water. In such cases, the Permittees shall comply with the following:

V.J.4.a. Notification - the Permittees shall notify the Secretary in writing within seven (7) calendar days of determining statistically significant evidence of contamination at the compliance point that they intend to make a demonstration of outside contamination, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)(6)(i)).

V.J.4.b. Submittal of demonstration - the Permittees shall, within ninety (90) calendar days, submit a report

to the Secretary which demonstrates that a source other than a regulated unit caused the contamination, or that the contamination resulted from error in sampling, analysis, or evaluation, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)(6)(ii)).

V.J.4.c. Submittal of modification request - the Permittees shall, within ninety (90) calendar days, submit to the Secretary an application for a permit modification to make any appropriate changes to the DMP, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)(6)(iii)).

V.J.4.d. Continued monitoring - the Permittees shall continue to monitor in compliance with the DMP, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)(6)(iv)).

#### V.K. REQUEST FOR PERMIT MODIFICATION

If the Permittees or the Secretary determines that the DMP no longer satisfies the requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264 Subpart F) and this Permit Module, the Permittees shall, within ninety (90) calendar days of the determination, submit an application for a permit modification to make any appropriate changes to the program in compliance with 20.4.1.500 and .900 NMAC (incorporating 40 CFR §264.98(h) and §270.42).

PERMIT ATTACHMENTS

Permit Attachment L (as modified from WIPP RCRA Part B Permit Application, "WIPP Groundwater Monitoring Program Plan" - Attachment D-18).